

## WHAT IS CLAIMED IS:

1. A method of detecting leaks in a refrigeration system that uses in combination a refrigerant and a refrigeration system lubricant comprising the steps of:

preparing a mixture that consists of said refrigeration system lubricant mixed with a predetermined amount of a dye selected from the general class of naphthalimide dye structures as a fluorescent dye;

adding a predetermined amount of the mixture to said refrigerant for use in refrigeration system;

operating the system for a predetermined period of time to allow the mixture to mix with said combination of refrigerant and the refrigeration system lubricant;

examining the system for a leak site with a lamp having an emission wavelength from 300 to 480 nanometers, directed at said refrigeration system;

determining the presence of a leak site by the presence of a colored fluorescence detectable under the light from said lamp at said leak site;

and said dye and refrigeration system lubricant mixture appearing at said leak site, remaining at said site without oxidation to provide an indication of a leak.

2. A method of detecting leaks in a refrigeration system as claimed in claim 1 wherein:

said adding step consists of the addition of at least 0.001 grams of said mixture to a said refrigeration system for each 100 grams of said refrigeration lubricant.

3. A method of detecting leaks in a refrigeration system as claimed in claim 2 wherein:

said adding step consists of the addition of at least 0.001 grams of said mixture to a system employing a mineral oil refrigerant lubricant for each 100 grams of said mineral oil refrigerant lubricant,

4. A method of detecting leaks in a refrigeration system as claimed in claim 2 wherein:

said adding step consists of the addition of at least 0.001 grams of said mixture to a system employing a polyalkylene glycol refrigerant lubricant for each 100 grams of said polyalkylene glycol refrigerant lubricant.

5. A method of detecting leaks in a refrigeration system as claimed in claim 2 wherein:

said adding step consists of the addition of at least 0.001 grams of said mixture to a system employing a polyol ester refrigerant lubricant for each 100 grams of said polyol ester refrigerant lubricant.

6. A method of detecting leaks in a refrigeration system as claimed in claim 1 wherein:

said mixture consists of at least 0.001 grams of  
fluorescent dye mixed with 100 grams of refrigeration system  
lubricant.

7. A method of detecting leaks in a refrigeration  
system as claimed in claim 6 wherein:

said mixture consists of .001 grams of fluorescent dye  
with 100 grams of mineral oil.

8. A method of detecting leaks in a refrigeration  
system as claimed in claim 6 wherein:

said mixture consists of .001 grams of naphthalimide dye  
with 100 grams of polyalkylene glycol.

9. A method of detecting leaks in a refrigeration  
system as claimed in claim 6 wherein:

said mixture consists of .001 grams of naphthalimide dye  
with 100 grams of polyol ester.

10. A method of detecting leaks in a refrigeration  
system as claimed in claim 1 wherein:

said mixture of a dye selected from the general class of  
naphthalimide fluorescent dyes and refrigeration system  
lubricant is allowed to remain in the refrigeration system for  
use in detecting possible future refrigeration system leaks.

11. A method of detecting leaks in a refrigeration system as claimed in claim 1 wherein:

said general class of naphthalimide dye structures incorporates nitrogen alkyl derivatives and functionalized ring chemistry, both carbocyclic and heterocyclic, selected from a group including nitrogen, sulfur, carbon and oxygen.

12. A method of detecting leaks in a refrigeration system as claimed in claim 1 wherein:

said refrigeration system is suitable for operation in a preselected mode including cooling, freezing, heating, ventilating and air conditioning.

13. A method of detecting leaks in a refrigeration system as claimed in claim 1 wherein:

said refrigeration system employs singly, or in combination, a refrigerant in a hermetic system, chosen from a group including chlorofluorocarbons (CFC), hydrochlorofluorocarbons (HCFC), hydrofluorocarbons (HFC), hydrogen, halogenated, and either derivatives of methane, hydrogen, halogenated, ether and cyclic derivatives of either ethane, propane, butane, pentane, mixtures of HCFC, HFC, hydrocarbons, carbon dioxide and ammonia.

14. A method of detecting leaks in a refrigeration system as claimed in claim 1 wherein:

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said refrigeration lubricant in said refrigeration systems is selected from a group including hydrocarbons such as natural mineral oils, refined mineral oils, synthetic hydrocarbons (SHC), alkylbenzenes (AB), polyalphaolefins (PAO), synthetic polyalkylene glycols that are terminated as monoethers, diethers, esters, and a general class of polyester lubricants including either di-, tri-, tetra- or polyfunctional pentaerythritol esters.

15. A method of detecting leaks in a refrigeration system as claimed in claim 1 wherein:

*a* said mixture is *in the mixture preparation step* solubilized by the addition of a solvent compatible with said refrigeration lubricant and said dye.

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